What is claimed is:

1. An image coding method comprising:

a step of deciding the type of an image in tile units and deciding the type of each tile according to the decision result;

a step of grouping all pixels included in a predetermined type of tile into pixels belonging to a first layer and pixels belonging to a second layer pixel by pixel; and

a step of performing different kinds of signal processing on the pixels belonging to said first layer and the pixels belonging to said second layer and then coding the processed signals.

2. An image coding method comprising:

a step of deciding whether each tile of an input image is a character image or photographic image and grouping each tile into a character tile or photographic tile according to the decision result;

a layering processing step of grouping all pixels that belong to said character tile into pixels belonging to a foreground and pixels belonging to a background pixel by pixel;

a step of deciding which of first signal processing suitable for compression of photographic images or second signal processing suitable for compression of bi-level images should be applied to each of all pixels belonging

to said character tile pixel by pixel with reference to the result of said layering processing and performing either said first or second signal processing on brightness information of each pixel according to said decision; and

a step of performing variable-length coding on information resulting from said first or second signal processing.

3. The image coding method according to claim 2, wherein said first signal processing is orthogonal transformation and quantization processing and said second signal processing is approximation processing that approximates brightness values of a plurality of pixels with a single typical value and said variable-length coding is arithmetic coding.

4. An image coding method comprising:

a step of deciding whether each tile of an input image is a character image or photographic image and grouping each tile as a character tile or photographic tile according to the result;

a step of grouping all pixels included in said character tile into pixels belonging to a foreground and pixels belonging to a background pixel by pixel and acquiring bitmap information indicating whether each pixel belongs to the foreground or background;

a step of deciding whether it is possible or not to apply approximation processing which approximates

brightness values of all pixels belonging to said foreground of said character tile or brightness values of all pixels belonging to said background with one typical value;

a step of deciding whether it is possible or not to apply approximation processing which approximates brightness values of all pixels included in said photographic tile with one typical value;

a step of applying orthogonal transformation and quantization processing to brightness information of all pixels of said photographic tile to which approximation processing is not applicable and brightness information of all pixels in said character tile to which approximation processing is not applicable; and

a step of applying variable-length coding to information indicating whether said approximation processing is applicable or not, information of the approximate value indicating the result of said approximation processing, information on the brightness resulting from said orthogonal transformation and quantization processing and said bitmap information.

5. The image coding method according to claim 4, further comprising a coding rate controlling step of predicting a coding rate when said variable-length coding is applied to the next tile and adaptively changing the quantization step width in said quantization processing based on the predicted value so that the coding rate falls within a

predetermined range.

6. The image coding method according to claim 4, further comprising a coding rate controlling step of predicting a coding rate first when the next tile is subjected to said variable-length coding, generating a scaling factor (α) with an integer value to adaptively change the quantization step width in said quantization processing based on the predicted value so that the coding rate falls within a predetermined range, then generating a scaling factor (β) with a real number value having a one-to-one correspondence with this scaling factor (α) with an integer value and changing the quantization step width in said quantization processing using this scaling factor (β) with a real number value.

7. The image coding method according to claim 6, wherein a correlation between a coding rate, said integer value scaling factor (α) and said real number value scaling factor (β) is determined so that a differentiation value of a function (f1) to generate said real number value scaling factor (β) from said integer value scaling factor (α) becomes the inverse number of a function (f2) indicating a relationship of said real number value scaling factor (β) with said coding rate.

8. An image coding apparatus comprising:

an image area deciding section that groups an input image into character image tiles and photographic image tiles;

a layering section that performs layering that groups each pixel into any one of a plurality of predetermined layers based on the brightness level of each pixel included in at least one tile among character image tiles or photographic tiles and generates bitmap information indicating the layer in which each pixel is included;

an approximation processing section that decides based on brightness information of said input image whether it is possible or not to approximate a plurality of image brightness values with one typical value in tile units or using said layer as a unit and performs approximation processing when approximation is applicable;

an orthogonal transformation/quantization section that performs orthogonal transformation and quantization on brightness information to which bi-level approximation is not applicable; and

a coding section that applies variable-length coding to data of the approximate value resulting from the approximation processing, data resulting from said orthogonal transformation and quantization, said bitmap information indicating the layer to which each pixel in said tile belongs and information indicating whether approximation processing is applicable or not.

9. The image coding apparatus according to claim 8, further comprising a coding rate control section that

predicts a coding rate based on the amount of image already coded and adaptively deciding the quantization step width used in the quantization processing by said orthogonal transformation/quantization section based on the predicted value so that the coding rate falls within a predetermined range.

10. The image coding apparatus according to claim 9, wherein said coding rate control section predicts a coding rate, first generates an integer value scaling factor (α) to adaptively change said quantization step width in said quantization processing based on the predicted value so that the coding rate falls within a predetermined range, then generates a scaling factor (β) with a real number value having a one-to-one correspondence with this integer value scaling factor (α) and gives this real number value scaling factor (β) to said orthogonal transformation/quantization section.

11. The image coding apparatus according to claim 10, wherein a correlation between a coding rate, said integer value scaling factor (α) and said real number value scaling factor (β) is predetermined so that a differentiation value of a function (f1) to generate said real number value scaling factor (β) from said integer value scaling factor (α) becomes the inverse number of a function (f2) indicating a relationship of said real number value scaling factor (β) with said coding rate.

12. A coding rate control apparatus comprising:

a coding rate estimation section that divides a multi-valued image into tiles of a predetermined size and estimates the coding rate of the tile based on the amount of image already coded when coding is performed after signal processing including quantization processing;

a first scaling factor generator that generates an integer value scaling factor (α) to adaptively change the quantization step width in said quantization processing according to the coding rate estimation result; and

a second scaling factor generator that generates a scaling factor (β) with a real number value having a one-to-one correspondence with said integer value scaling factor (α) and supplies the real number value scaling factor (β) to a quantizer that performs said quantization processing.

13. The coding rate control apparatus according to claim 12, wherein a correlation between a coding rate, said integer value scaling factor (α) and said real number value scaling factor (β) is predetermined so that a differentiation value of a function (f1) to generate said real number value scaling factor (β) from said integer value scaling factor (α) becomes the inverse number of a function (f2) indicating a relationship of said real number value scaling factor (β) with said coding rate.